

Plastic Darlington Complementary Silicon Power Transistors

... designed for general purpose amplifier and high-speed switching applications.

- High DC Current Gain
 $h_{FE} = 1400$ (Typ) @ $I_C = 2.0$ Adc
- Collector-Emitter Sustaining Voltage — @ 10 mAdc
 $V_{CEO(sus)} = 45$ Vdc (Min) — BD776
 $= 60$ Vdc (Min) — BD777, 778
 $= 80$ Vdc (Min) — BD780
- Reverse Voltage Protection Diode
- Monolithic Construction with Built-in Base-Emitter output Resistor

MAXIMUM RATINGS

Rating	Symbol	BD776	BD777 BD778	BD780	Unit
Collector-Emitter Voltage	V_{CEO}	45	60	80	Vdc
Collector-Base Voltage	V_{CB}	45	60	80	Vdc
Emitter-Base Voltage	V_{EB}	5.0			Vdc
Collector Current — Continuous Peak	I_C	4.0 6.0			Adc
Base Current	I_B	100			mAdc
Total Device Dissipation $T_C = 25^\circ\text{C}$ — Derate above 25°C	P_D	15 0.12			Watts W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +150			$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	8.34	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	83.3	$^\circ\text{C/W}$

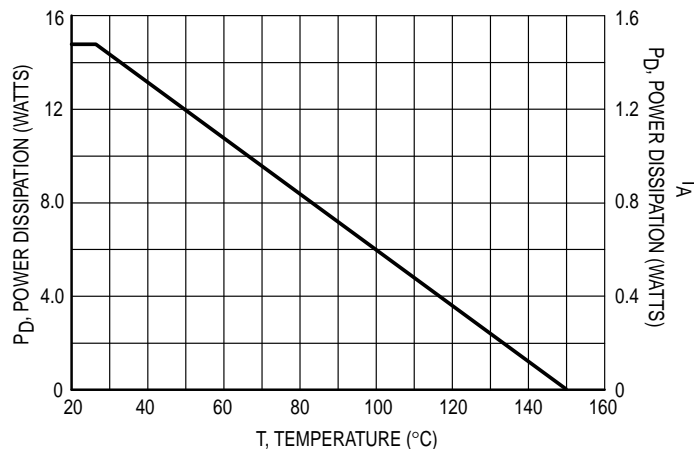


Figure 1. Power Derating

Preferred devices are Motorola recommended choices for future use and best overall value.

REV 7

NPN
BD777
PNP
BD776

BD778

BD780*

*Motorola Preferred Device

DARLINGTON
4-AMPERE
COMPLEMENTARY
SILICON
POWER TRANSISTORS
45, 60, 80 VOLTS
15 WATTS

CASE 77-08
TO-225AA TYPE

BD777 BD776 BD778 BD780

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit	
OFF CHARACTERISTICS					
Collector-Emitter Sustaining Voltage (1) (I _O = 10 mA _{dc} , I _B = 0)	BD776 BD777, BD778 BD780	V _{CEO(sus)}	45 60 80	— — —	V _{dc}
Collector Cutoff Current (V _{CE} = 20 V _{dc} , I _B = 0) (V _{CE} = 30 V _{dc} , I _B = 0) (V _{CE} = 40 V _{dc} , I _B = 0)	BD776 BD777, BD778 BD780	I _{CEO}	— — —	100 100 100	μA _{dc}
Collector Cutoff Current (V _{CB} = Rated, V _{CEO(sus)} , I _E = 0) (V _{CB} = Rated, V _{CEO(sus)} , I _E = 0, I _C = 100°C)		I _{CBO}	— —	1.0 100	μA _{dc}
Emitter Cutoff Current (V _{BE} = 5.0 V _{dc} , I _C = 0)		I _{EBO}	—	1.0	μA _{dc}
ON CHARACTERISTICS					
DC Current Gain (I _C = 2.0 A _{dc} , V _{CE} = 3.0 V _{dc})		H _{FE}	750	—	
Collector-Emitter Saturation Voltage (I _C = 1.5 A _{dc} , I _B = 6 mA _{dc})		V _{CE(Sat)}	—	1.5	V _{dc}
Base Emitter Saturation Voltage (I _C = 1.5 A _{dc} , I _B = 6 mA _{dc})		V _{BE(Sat)}	—	2.5	V _{dc}
Base-Emitter On Voltage (I _C = 1.5 A _{dc} , V _{CE} = 3 V _{dc})		V _{BE(On)}	—	2.3	V _{dc}
Output Diode Voltage Drop (I _{EC} = 2.0 A _{dc})		V _{EC}	—	2.0	V _{dc}
DYNAMIC CHARACTERISTICS					
Current Gain Bandwidth Product (I _C = 1.0 A _{dc} , V _{CE} = 2.0 V _{dc})		f _T	20	—	MHz
		Symbol	Min	Typ	Unit
Turn-On Time (I _C = 250 mA, V _{CE} = 2 V)	BD775-777 BD776-778-780	t _{on}	—	250 150	ns
Turn-Off Time (I _C = 250 mA, V _{CE} = 2 V)	BD775-777 BD776-778-780	t _{off}	—	600 400	ns

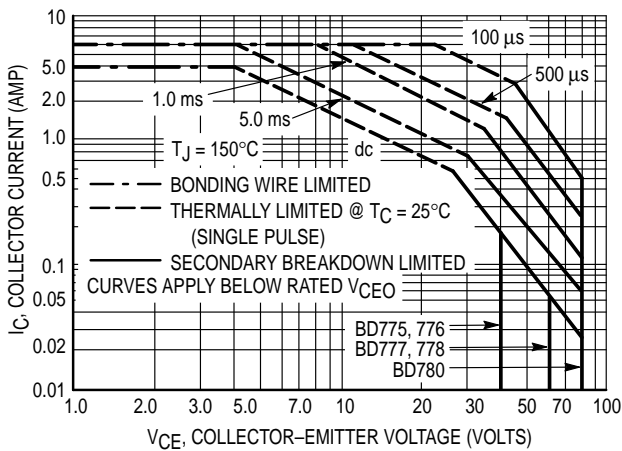


Figure 2. Active Region Safe Operating Area

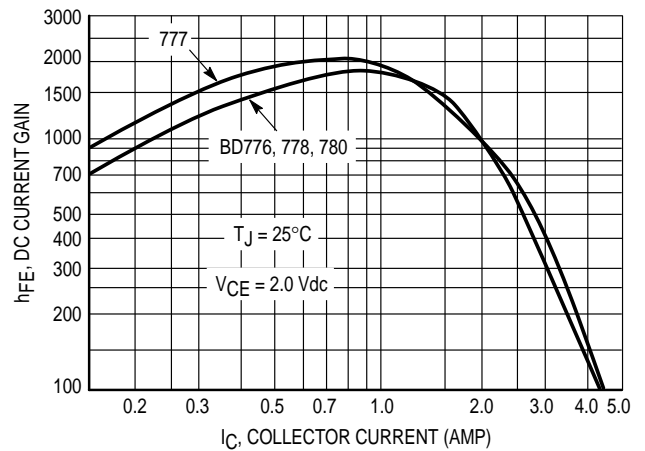


Figure 3. Typical DC Current Gain

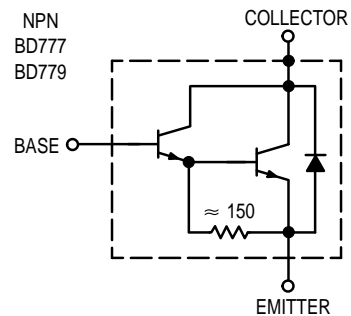
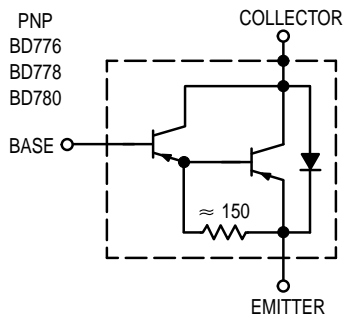
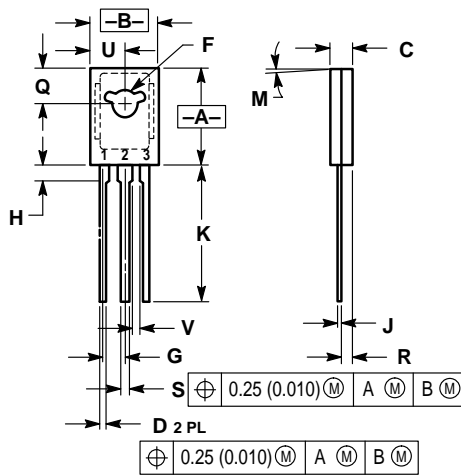


Figure 4. Darlington Circuit Schematic

PACKAGE DIMENSIONS




- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.425	0.435	10.80	11.04
B	0.295	0.305	7.50	7.74
C	0.095	0.105	2.42	2.66
D	0.020	0.026	0.51	0.66
F	0.115	0.130	2.93	3.30
G	0.094 BSC		2.39 BSC	
H	0.050	0.095	1.27	2.41
J	0.015	0.025	0.39	0.63
K	0.575	0.655	14.61	16.63
M	5° TYP		5° TYP	
Q	0.148	0.158	3.76	4.01
R	0.045	0.055	1.15	1.39
S	0.025	0.035	0.64	0.88
U	0.145	0.155	3.69	3.93
V	0.040	—	1.02	—

- STYLE 1:
 PIN 1. EMITTER
 2. COLLECTOR
 3. BASE

**CASE 77-08
 TO-225AA TYPE
 ISSUE V**

BD777 BD776 BD778 BD780

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BD777/D

